

**Toshiba Mobile Display Co., Ltd.**

## PRODUCT INFORMATION

31cm COLOUR TFT-LCD MODULE  
(12.1 TYPE)  
**LTD121EDDZ**  
(p-Si TFT)

**FEATURES**

- (1) 12.1"XGA(1024x768 pixels) display size for notebook PC
- (2) LED Backlight ( LED 44pcs : 11 Serial connection x 4 )
- (3) Low reflection, Anti-Glare
- (4) Light weight design : 135g(typ)

**TENTATIVE****MECHANICAL SPECIFICATIONS**

Item	Specifications
Dimensional Outline (typ.)	255.0(W) x 205.2 (H) x 2.4(D) mm
Number of Pixels	1024 (W) x 768(H) pixels
Active Area	245.76(W) x 184.32(H) mm
Pixel Pitch	0.240(W) x 0.240(H)
Weight (approximately)	142 g (typ)
Backlight	LED

**ABSOLUTE MAXIMUM RATINGS**

Item	Min.	Max.	Unit
Supply Voltage ( $V_{DD}$ )	-0.3	4.0	V
LED Reverse Voltage ( $V_{RLED}$ )	-	5.0	V
LED Forward Current ( $I_{FLED}$ )	-	30	mA
Input Signal Voltage ( $V_{IN}$ )	-0.3	$V_{DD}+0.3$	V
Operating Temperature	0	50	°C
Storage Temperature	-20	60	°C
Storage Humidity	10	90	%(RH)

**ELECTRICAL SPECIFICATION**

Item		Min.	Typ.	Max.	Unit	Remarks
Supply Voltage	( $V_{DD}$ )	2.35	2.5	2.7	V	
Supply LED Currency	( $I_{LED}$ )	---	---	18	mA	*2
Common Mode Input Voltage	( $V_{CM}$ )	VID/2	1.25	$V_{DD}-(VID/2)$	V	
Differential Input Amplitude	( $V_{ID}$ )	100	---	600	mV	
Current Consumption	*1 ( $I_{DD}$ )	---	(240)	(320)	mA	
Power Consumption		---	(3.2)	---	W	$I_{LED}=18mA$

\*1 : 8 color bars pattern

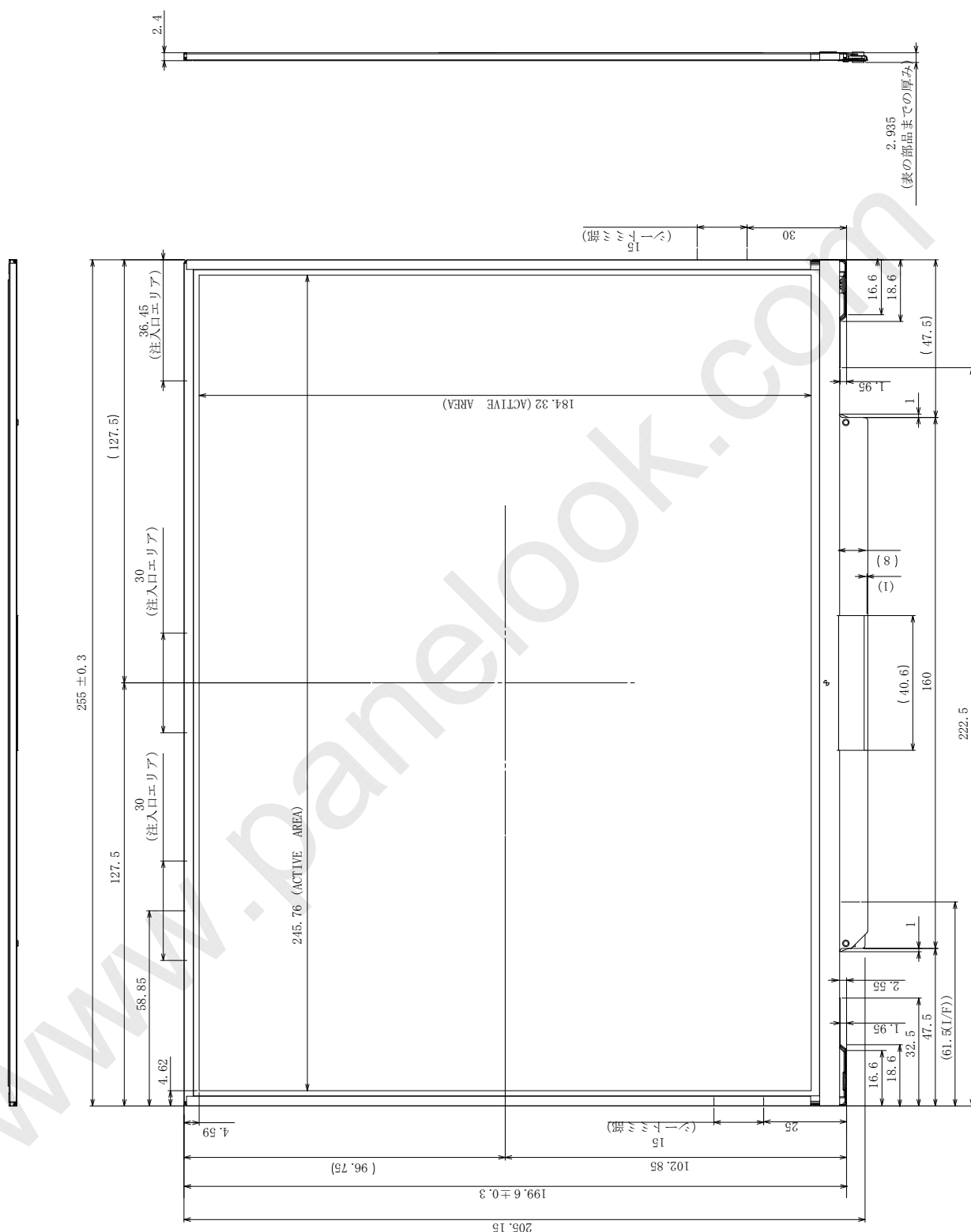
\*2 : The current value of each row should be the same value.

**OPTICAL SPECIFICATION ( $T_a=25^{\circ}C$ )**

Item		Min.	Typ.	Max.	Unit	Remarks
Contrast Ratio (CR)		200	(250)	---	---	
Response Time	( $t_{ON}$ )	---	---	20	ms	
	( $t_{OFF}$ )	---	---	40	ms	
Luminance (L)		200	300	---	cd/m <sup>2</sup>	$I_{LED}=18mA$

\*The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by Toshiba Mobile Display or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Toshiba Mobile Display or others.

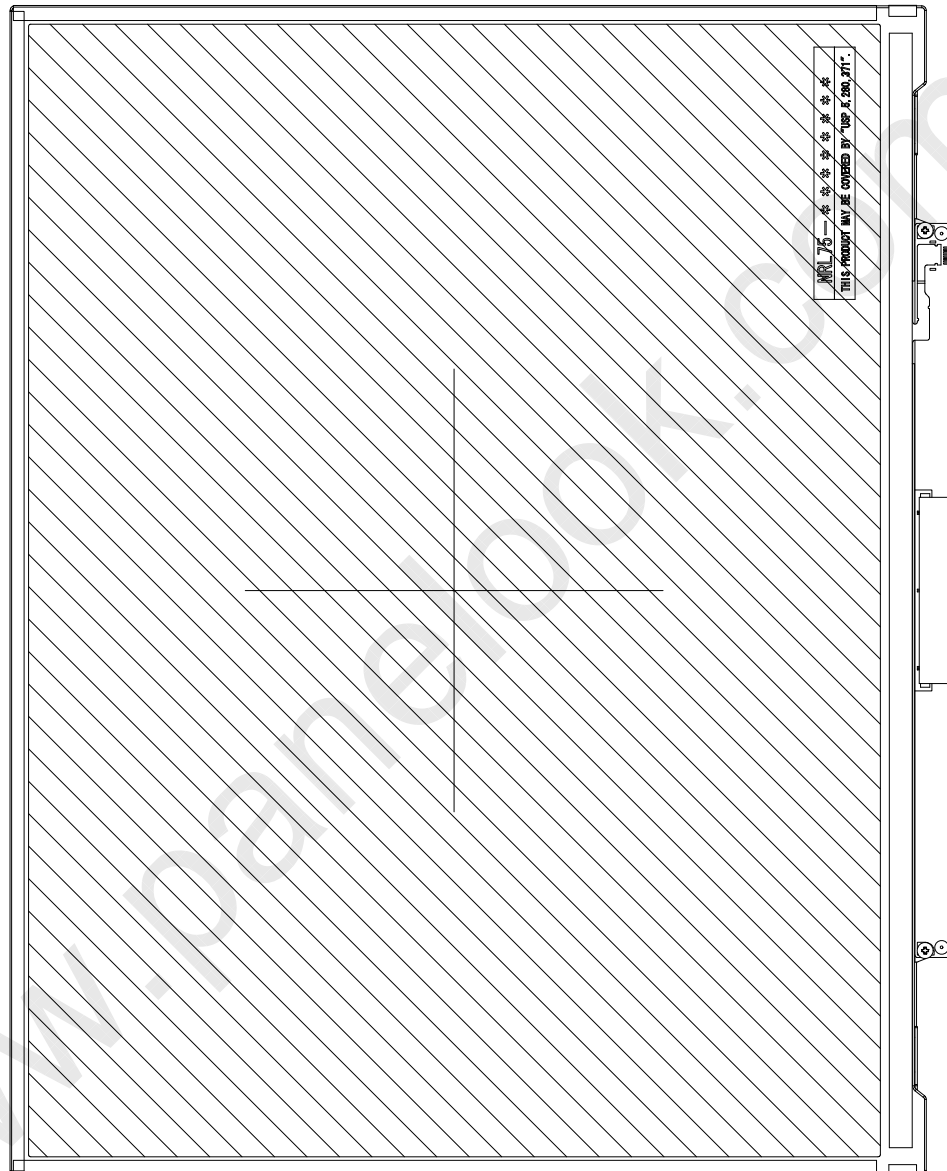
\*The information contained herein may be changed without prior notice. It is therefore advisable to contact Toshiba Mobile Display before proceeding with the design of equipment incorporating this product.

**TENTATIVE**

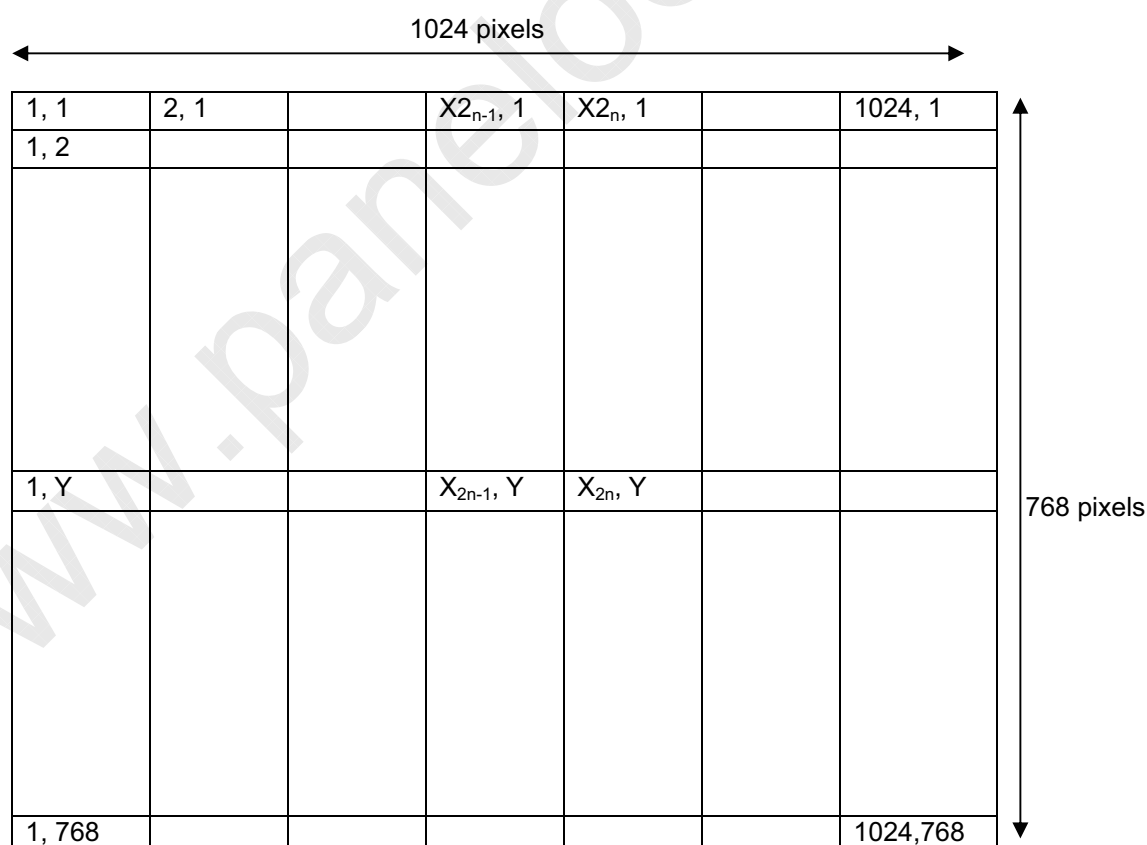


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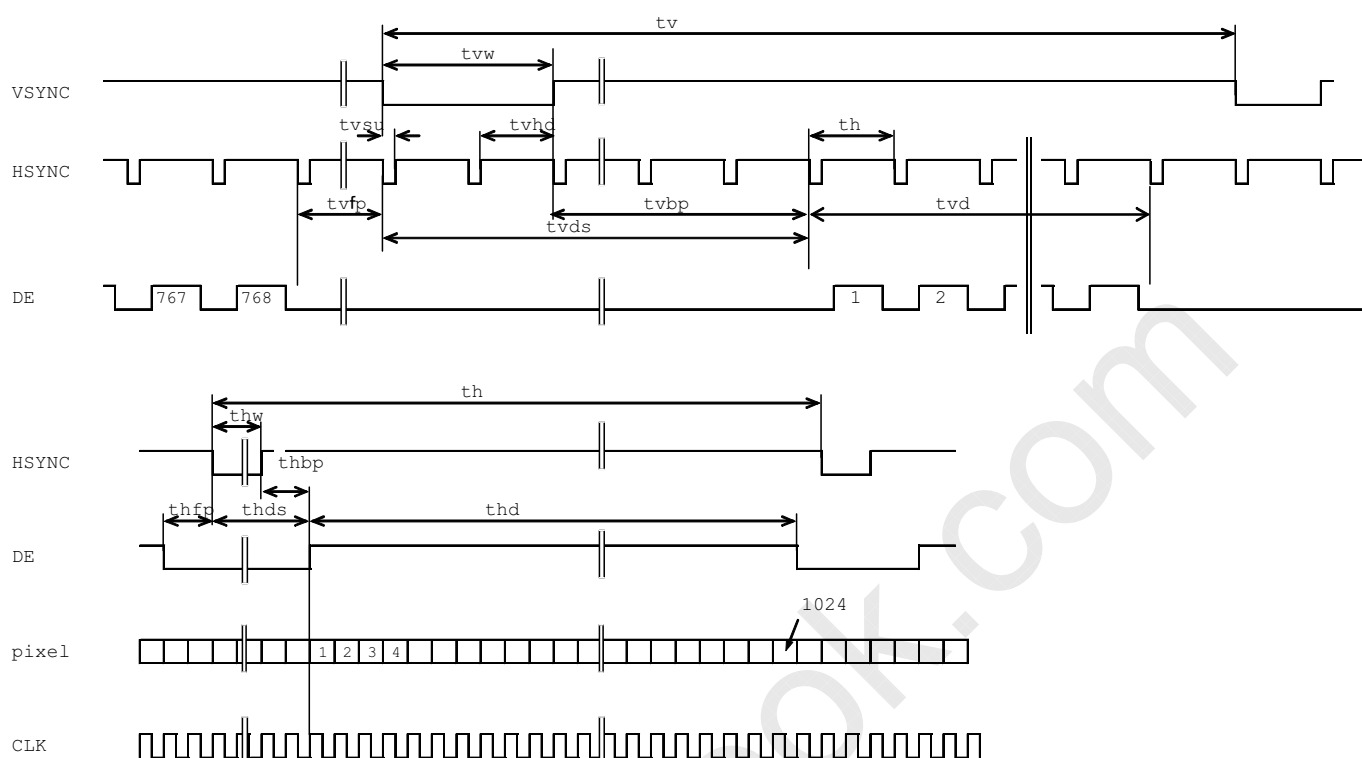
**TENTATIVE**



The diagram illustrates the internal architecture of the LCD module. A **Connector** on the left provides input to three main components: a **Panel Controller** (which includes LVDS), a **DC/DC converter**, and an **LED** strip. The **Panel Controller** also receives a signal from **CN 1**. It outputs signals to the **Y-driver**, **X-driver**, and the **LED**. The **DC/DC converter** outputs to the **Y-driver** and provides power to a **Gray scale Manipulation Voltage Generation Circuit**, which in turn provides power to the **Panel Controller**. The **Y-driver**, **X-driver**, and **LED** are all connected to the **Liquid Crystal Panel**, which has a resolution of **1024 x 768 pixels**.



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**TENTATIVE****TIMING CHART****TIMING SPECIFICATION**

Item	Symbol	min.	Typ.	Max.	unit
Horizontal Scanning Term	$th$	$1160 \times tc$	-	$1344 \times tc$	clock
H-sync Pulse Width	$thw$	$4 \times tc$	-	$136 \times tc$	clock
Horizontal Front Porch	$thfp$	$4 \times tc$	-	$24 \times tc$	clock
Horizontal Back Porch	$thbp$	$4 \times tc$	-	$160 \times tc$	clock
Horizontal Display Term	$thd$	$1024 \times tc$	$1024 \times tc$	$1024 \times tc$	clock
Frame Period	$tv$	$776 \times th$	-	$806 \times th$	line
V-sync Pulse Width	$tvw$	$1 \times th$	-	$6 \times th$	line
Vertical Front Porch	$tvfp$	$1 \times th$	-	$3 \times rh$	line
Vertical Back Porch	$tvbp$	$2 \times th$	-	$29 \times th$	line
Vertical Display Term	$tvd$	$768 \times th$		$768 \times th$	line
Clock Period	$tc$	18.52	-	15.38(65MHz)	ns

**TENTATIVE****CONNECTOR PIN ASSIGNMENT FOR INTERFACE****CN1 INPUT SIGNAL**

Connector : FI-J30S-VF15N/JAE

Mating Connector : FI-J30SC /JAE

Terminal No.	Symbol	Function
1	GND	
2	IN0 -	LVDS Signal-0 (-)
3	IN0 +	LVDS Signal-0 (+)
4	IN 1 -	LVDS Signal-1 (-)
5	IN 1 +	LVDS Signal-1 (+)
6	IN 2 -	LVDS Signal-2 (-)
7	IN 2 +	LVDS Signal-2 (+)
8	CLK -	LVDS Clock Signal(-)
9	CLK +	LVDS Clock Signal(+)
10	NC	Non-Connection
11	NC	Non-Connection
12	GND	
13	GND	
14	GND	
15	GND	
16	NC	Non-Connection
17	NC	Non-Connection
18	VDD	+2.5V
19	VDD	+2.5V
20	VDD	+2.5V
21	NC	Non-Connection
22	VCD21	LED Cathode(Negative)
23	VCD22	LED Cathode(Negative)
24	VCD11	LED Cathode(Negative)
25	VCD12	LED Cathode(Negative)
26	NC	Non-Connection
27	NC	Non-Connection
28	NC	Non-Connection
29	VAD 2	LED Anode(Positive)
30	VAD 1	LED Anode(Positive)

Note 1) Please connect GND pin to ground. Don't use it as no-connect nor connection with high impedance.

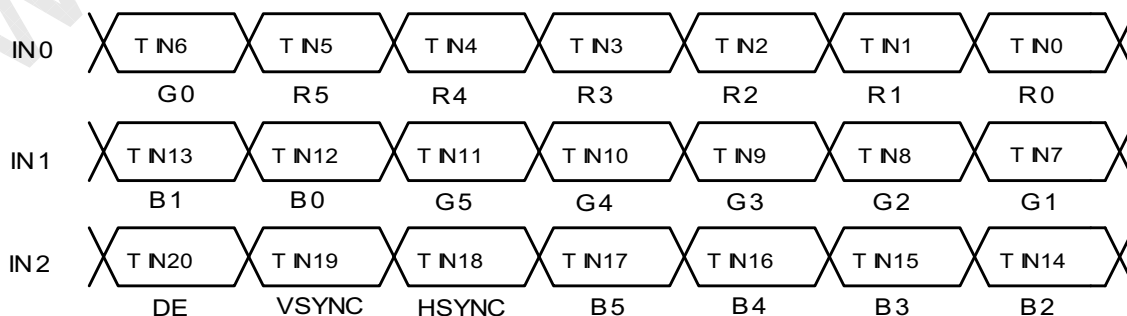
Note 2) Please connect NC to nothing. Don't connect it to ground nor to other signal input.

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**TENTATIVE****RECOMMENDED TRANSMITTER (THC63LVDF63A,THC63LVDM63A,THC63LVDM63A-85)  
TO LTD121EDDX INTERFACE ASSIGNMENT****Case1: 6bit Transmitter**

THC63LVDF63A,THC63LVDM63A,THC63LVDM63A-85				LTD121EDDX Interface (CN1)	
Input Terminal No.		Input Signal (Graphics controller output signal)		Output Signal Symbol	
Symbol	Terminal	Symbol	Function		
TIN0	44	R0	Red Pixels Display Data (LSB)	TOUT0- TOUT0+	No.2 No.3  IN0- IN0+
TIN1	45	R1	Red Pixels Display Data		
TIN2	47	R2	Red Pixels Display Data		
TIN3	48	R3	Red Pixels Display Data		
TIN4	1	R4	Red Pixels Display Data		
TIN5	3	R5	Red Pixels Display Data (MSB)		
TIN6	4	G0	Green Pixels Display Data (LSB)	TOUT1- TOUT1+	No.4 No.5  IN1- IN1+
TIN7	6	G1	Green Pixels Display Data		
TIN8	7	G2	Green Pixels Display Data		
TIN9	9	G3	Green Pixels Display Data		
TIN10	10	G4	Green Pixels Display Data		
TIN11	12	G5	Green Pixels Display Data (MSB)		
TIN12	13	B0	Blue Pixels Display Data (LSB)	TOUT2- TOUT2+	No.6 No.7  IN2- IN2+
TIN13	15	B1	Blue Pixels Display Data		
TIN14	16	B2	Blue Pixels Display Data		
TIN15	18	B3	Blue Pixels Display Data		
TIN16	19	B4	Blue Pixels Display Data		
TIN17	20	B5	Blue Pixels Display Data (MSB)		
TIN18	22	HSYNC	H-Sync	TCLK OUT- TCLK OUT+	No.8 No.9  CLK- CLK+
TIN19	23	VSYNC	V-Sync		
TIN20	25	DE	Compound Synchronization Signal		
CLK IN	26	CLK	Data Sampling Clock		

Note 1) Please connect NC pin to nothing. Don't connect it to ground nor to other signal input.





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**TENTATIVE****256k (k=1024) COLORS COMBINATION TABLE**

	Display	R5 R4 R3 R2 R1 R0	G5 G4 G3 G2 G1 G0	B5 B4 B3 B2 B1 B0	Gray Scale Level
Basic Color	Black	L L L L L L L	L L L L L L L	L L L L L L L	-
	Blue	L L L L L L L	L L L L L L L	H H H H H H H	-
	Green	L L L L L L L	H H H H H H H	L L L L L L L	-
	Light Blue	L L L L L L L	H H H H H H H	H H H H H H H	-
	Red	H H H H H H H	L L L L L L L	L L L L L L L	-
	Purple	H H H H H H H	L L L L L L L	H H H H H H H	-
	Yellow	H H H H H H H	H H H H H H H	L L L L L L L	-
	White	H H H H H H H	H H H H H H H	H H H H H H H	-
Gray Scale of Red	Black	L L L L L L L	L L L L L L L	L L L L L L L	L 0
	Dark ↑ ↓ Light	L L L L L L H	L L L L L L L	L L L L L L L	L 1
		L L L L L H L	L L L L L L L	L L L L L L L	L 2
		⋮	⋮	⋮	L3... L60
		H H H H L H	L L L L L L L	L L L L L L L	L61
		H H H H H L	L L L L L L L	L L L L L L L	L62
	Red	H H H H H H H	L L L L L L L	L L L L L L L	Red L63
	Gray Scale of Green	Black	L L L L L L L	L L L L L L L	L L L L L L L
Dark ↑ ↓ Light		L L L L L L L	L L L L L L H	L L L L L L L	L 1
		L L L L L L L	L L L L L H L	L L L L L L L	L 2
		⋮	⋮	⋮	L3... L60
		L L L L L L L	H H H H L H	L L L L L L L	L61
		L L L L L L L	H H H H H L	L L L L L L L	L62
Green		L L L L L L L	H H H H H H H	L L L L L L L	Green L63
Gray Scale of Blue		Black	L L L L L L L	L L L L L L L	L L L L L L L
	Dark ↑ ↓ Light	L L L L L L L	L L L L L L L	L L L L L L H	L 1
		L L L L L L L	L L L L L L L	L L L L H L	L 2
		⋮	⋮	⋮	L3... L60
		L L L L L L L	H H H H L H	H H H H L H	L61
		L L L L L L L	L L L L L L L	H H H H H L	L62
	Blue	L L L L L L L	L L L L L L L	H H H H H H H	Blue L63
	Gray Scale of White & Black	Black	L L L L L L L	L L L L L L L	L L L L L L L
Dark ↑ ↓ Light		L L L L L L H	L L L L L L H	L L L L L L H	L 1
		L L L L L H L	L L L L L H L	L L L L H L	L 2
		⋮	⋮	⋮	L3... L60
		H H H H L H	H H H H L H	H H H H L H	L61
		H H H H H L	H H H H H L	H H H H H L	L62
White		H H H H H H H	H H H H H H H	H H H H H H H	white L63



**FOR SAFETY****TENTATIVE**

LCD module is generally designed with precise parts to achieve light weighted thin mechanical dimensions.

In using our Modules, make certain that you fully understand and put into practice the warnings and safety precautions detailed in Engineering Information No.EE-N001,"CAUTIONS AND INSTRUCTIONS FOR TOSHIBA LCD MODULES".

Refer to individual specifications and TECHNICAL DATA sheets (hereinafter called "TD") for more detailed technical information.

## 1) SPECIAL PURPOSES

A) Toshiba Mobile Display's Standard LCD Modules have not been customized for operation in extreme environments or for use in applications where performance failures could be life-threatening or otherwise catastrophic.

B) Since Toshiba Mobile Display's Standard LCD Modules have not been designed for operation in extreme environments, they must never be used in devices that will be exposed to abnormally high levels of vibration or shock which exceed Toshiba Mobile Display's published specification limits.

C) In addition, since Toshiba Mobile Display Standard LCD Modules have not been designed for use in applications where performance failures could be life-threatening or catastrophic, they must never be installed in aircraft navigation control systems (such as, but not limited to Traffic Collision Avoidance System and Air Traffic Indicator), in military defense or weapons systems, in critical industrial process-control systems (e.g., those involved in the production of nuclear energy), or in critical medical device or patient life-support systems.

## 2) DISASSEMBLING OR MODIFICATION

DO NOT DISASSEMBLE OR MODIFY the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display.

Toshiba Mobile Display does not warrant the module, if customer disassembled or modified it.

## 3) BREAKAGE OF LCD PANEL

DO NOT INGEST liquid crystal material, DO NOT INHALE this material, and DO NOT CONTACT the material with skin, if LCD panel is broken and liquid crystal material spills out.

If liquid crystal material comes into mouth or eyes, rinse mouth or eyes out with water immediately.

If this material contact with skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

## 4) GLASS OF LCD PANEL

BE CAREFUL WITH CHIPS OF GLASS that may cause injuring fingers or skin, when the glass is broken.

## 5) ELECTRIC SHOCK

DISCONNECT POWER SUPPLY before handling LCD module.

DO NOT TOUCH the parts inside LCD module and the fluorescent lamp's connector or cables in order to prevent electric shock, because high voltage is supplied to these parts from the inverter unit while power supply is turned on.

## 6) ABSOLUTE MAXIMUM RATINGS AND POWER PROTECTION CIRCUIT

DO NOT EXCEED the absolute maximum rating values under the worst probable conditions caused by the supply voltage variation, input voltage variation, variation in parts' constants, environmental temperature, etc., otherwise LCD module may be damaged.

Employ protection circuit for power supply, whenever the specification or TD specifies it.

Suitable protection circuit should be applied for each system design.

## 7) RECOMMENDED OPERATION CONDITIONS

The performance and quality of the LCD panel are warranted only when the LCD panel is used within "the recommended operation conditions". Toshiba Mobile Display Co., Ltd. never warrants the performance and quality of the LCD panel when you use the LCD panel over "the recommended operation conditions", although within "the absolute maximum rating".

To use the LCD panel over "the recommended operation conditions" may have bad influence on the characteristics and reliability of the LCD panel and may shorten the life of the LCD panel.

Therefore, when designing the whole set, not to be over "the recommended operation conditions", you should fully take care of supply voltage change, characteristic of connection parts, surge of input-and-output line, and surrounding temperature.

## 8) DISPOSAL

When dispose LCD module, obey to the applicable environmental regulations.